

## Exercises for Integral calculus

7<sup>th</sup> February, 2006

1. Find the definite integrals,  $\int (20x^6 + 3x^4 - 6x^3) dx$ ,  $\int \frac{1}{x+1} dx$ ,  $\int 8\sqrt{x-7} dx$ ,  $\int 4e^{-3.5t} dt$ , and  $\int 3x^{-\frac{2}{3}} dx$ .

2. Find the definite integral

$$\int (2e^{3t} - 3e^{-5t}) dt$$

given an initial, or a boundary condition  $F(0) = 3$ .

3. Find the values of the definite integrals,  $\int_1^3 5x^3 dx$ ,  $\int_1^2 4e^{\frac{1}{2}} dt$ ,  $\int_2^5 6x^{-3}$ , and  $\int_{-3}^{-1} (-4)e^{-2t} dt$ .

4. Find a firm's total revenue  $r_t$  function, given the marginal revenue function  $r_m = -.2x^2 - 1.3x + 500$ .

5. Let the present value be  $p = a^{-rt}$  of the sum of money  $a$  to be received in the future when the interest is compounded continuously. Find the present value  $p_n$  of a stream of future income, that is to say, the money to be received each year for  $n$  years.

6. Find the following integrals and definite integrals.

$\int 8x^{\frac{2}{3}} dx$	$\int_1^2 8x^{\frac{2}{3}} dx$	$\int \sqrt{x+2} dx$	$\int_1^2 \sqrt{x+2} dx$
$\int \frac{3}{t^4} dt$	$\int_1^2 \frac{3}{t^4} dt$	$\int (10 - 2x^2) dx$	$\int_1^2 (10 - 2x^2) dx$
$\int 4(x-3)^{-3} dx$	$\int_1^2 4(x-3)^{-3} dx$	$\int 10e^{1.2t} dt$	$\int_1^2 10e^{1.2t} dt$
$\int \frac{3x^4}{\sqrt{3x^2-3}} dx$	$\int_1^2 \frac{3x^4}{\sqrt{3x^2-3}} dx$	$\int \frac{1}{\sqrt{x}} dx$	$\int_1^2 \frac{1}{\sqrt{x}} dx$
$\int \left( \frac{1}{\sqrt{x}} + \frac{1}{x} + x \right) dx$	$\int_1^2 \left( \frac{1}{\sqrt{x}} + \frac{1}{x} + x \right) dx$	$\int x(6x+3) dx$	$\int_1^2 x(6x+3) dx$
$\int (3x^3 + 9x^2) dx$	$\int_1^2 (3x^3 + 9x^2) dx$	$\int \left( x^{\frac{3}{4}} + \frac{1}{x} \right) dx$	$\int_1^2 \left( x^{\frac{3}{4}} + \frac{1}{x} \right) dx$
$\int (5+x)^2 dx$	$\int_1^2 (5+x)^2 dx$	$\int \left( 3\alpha^{\frac{3}{8}} + \frac{1}{2x} + e^x \right) dx$	$\int_1^2 \left( 3\alpha^{\frac{3}{8}} + \frac{1}{2x} + e^x \right) dx$
$\int 2x(x+3)^2 dx$	$\int_1^2 2x(x+3)^2 dx$	$\int (1 - e^{-3t}) dt$	$\int_1^2 (1 - e^{-3t}) dt$
$\int (e^5 + e^{-2t} + \frac{1}{t}) dt$	$\int_1^2 (e^5 + e^{-2t} + \frac{1}{t}) dt$	$\int \frac{1}{x} dx$	$\int_1^2 \frac{1}{x} dx$
$\int (e^{2t} + 3t^2 + \frac{1}{t}) dt$	$\int_1^2 (e^{2t} + 3t^2 + \frac{1}{t}) dt$	$\int e^3 dt$	$\int_1^2 e^3 dt$
$3 \int u^{\frac{1}{2}} du$	$3 \int_1^2 u^{\frac{1}{2}} du$	$\int -5 dx$	$\int_1^2 -5 dx$
$\int \frac{1}{x^5} dx$	$\int_1^2 \frac{1}{x^5} dx$	$\int xe^x dx$	$\int_1^2 xe^x dx$
$\int 5e^{-2t} dt$	$\int_1^2 5e^{-2t} dt$	$\int \frac{x}{x+1} dx$	$\int_1^2 \frac{x}{x+1} dx$
$\int (6\sqrt{x} + \frac{3}{x}) dx$	$\int_1^2 (6\sqrt{x} + \frac{3}{x}) dx$	$\int e^{\frac{1}{3}} dt$	$\int_1^2 e^{\frac{1}{3}} dt$
$\int \left( 5x^{\frac{1}{4}} + \frac{1}{x} + e^x \right) dx$	$\int_1^2 \left( 5x^{\frac{1}{4}} + \frac{1}{x} + e^x \right) dx$	$\int 3e^{2t} dt$	$\int_1^2 3e^{2t} dt$
$\int (2\sqrt{x} + \frac{1}{x}) dt$	$\int_1^2 (2\sqrt{x} + \frac{1}{x}) dt$	$\int x\sqrt{x+7} dx$	$\int_1^2 x\sqrt{x+7} dx$
$\int 3\sqrt{x} dx$	$\int_1^2 3\sqrt{x} dx$	$\int (12\sqrt{x} - \frac{1}{x}) dx$	$\int_1^2 (12\sqrt{x} - \frac{1}{x}) dx$
$\int -\sqrt{x} dx$	$\int_1^2 -\sqrt{x} dx$	$\int \left( \frac{2}{x} + e^x \right) dx$	$\int_1^2 \left( \frac{2}{x} + e^x \right) dx$
$\int \left( \frac{1}{x} + 2e^x \right) dx$	$\int_1^2 \left( \frac{1}{x} + 2e^x \right) dx$	$\int 3x^{-1} dx$	$\int_1^2 3x^{-1} dx$
$\int \frac{2x}{(x+1)^2} dx$	$\int_1^2 \frac{2x}{(x+1)^2} dx$	$\int 2(x-1)^{-2} dx$	$\int_1^2 2(x-1)^{-2} dx$

## Reference

- Edward T Dowling. *Mathematical methods for business and economics*. Schaum's outline series, 1993
- Kit Tyabandha. Integral calculus practice. *Practices for Business Mathematics*. 10 Jan 2006, Bangkok, 2006